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AUTOMOBILE UPDATE: FACTS AND FIGURES

Staff Paper

Prepared by the

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PREFACE

The idea for this paper grew out of an annual seminar conducted by the author at the Industrial College of the Armed Forces. The aim of the seminar is to examine Federal policy, key issues, and future trends in the U.S. automobile industry. The visual materials included here are used as slides and handouts.

From preparing and conducting this seminar over a period of four years and from requests for information and interpretation received from staff members of Congressional Committees, it is clear that, even among well-informed persons, there are misperceptions and blind spots in our understanding of the automobile industry — faults from which the author is by no means immune. The information assembled here is intended to dispel some of this misunderstanding by bringing out facts that may help explain current domestic and international developments.

There is no attempt to draw a comprehensive picture of the automobile industry or to present detailed analysis and interpretation. Rather, the intent is to offer certain facts — some familiar, others less known — and to make certain connections among them that will prompt the reader to reexamine recent trends and events in the automobile industry. The hope is that these observations will provide additional perspective on a technology that is familiar to nearly everyone but not commonly understood.

THE AUTOMOBILE TRANSPORTATION SYSTEM

The automobile transportation system and the high degree of mobility that it affords are distinguishing features of American life. Almost 40 percent of all automobiles in the world are in the United States. Not only do we have more automobiles than any other country, our rate of ownership (0.64 for persons over 18) is the highest in the world. In fact, we have more automobiles than children (109 million passenger cars in 1983 compared to 63 million persons under the age of 18). Nearly nine of every ten households have a motor vehicle available, and over half have two or more. Our highways and streets form a vast network: nearly 4 million miles of roadway, of which 82 percent are paved. Collectively, the passenger cars in the United States travel about 1.2 trillion miles per year — an average of just under 10,000 miles per vehicle. Americans spent over $275 billion in 1983 for automobile transportation — about equally divided among purchase costs, gasoline and oil expenditures, and other other operational expenses (including insurance). It is estimated that about one job in six in the United States is in automobile and parts manufacturing, highway construction and maintenance, petroleum refining and distribution, and the many services associated with automobile ownership and use.

FEDERAL GOVERNMENT POLICY AND CONGRESSIONAL CONCERNS

CONGRESSIONAL COMMITTEE JURISDICTIONS RELATED TO AUTOMOBILES

The pervasiveness of the automobile in our society is mirrored in the organization of the Congress. Almost half of the committees in the Senate and over one-third of those in the House have jurisdiction over some aspect of the automobile industry. Their interests range from fuel economy, emissions and safety to foreign competition, R&D, employment, and consumer protection. If the definition of automobile-related interest is broadened to include highways, petroleum supply, and other aspects of the automobile transportation system, there is a total of 20 of 39 standing committees of the House and Senate that have some legislative responsibility for the automobile. In addition, there is the Joint Economic Committee, which is concerned with the automobile in terms of transportation, international trade, employment, and industrial productivity. At the subcommittee level, 33 of 106 subcommittees in the Senate and 36 of 129 in the House are concerned with the automobile in some way.

CONGRESSIONAL COMMITTEE JURISDICTION RELATED TO AUTOMOBILES

SENATE

COMMITTEE	SUBCOMMITTEE	AREAS OF INTEREST
Appropriations	Transportation	DOT, DOE, and EPA budgets
Banking, Housing, and Urban Affairs	Economic Policy	Auto industry investment
Commerce, Science, and Transportation	Surface Transportation	Fuel economy, safety, and R&D
Energy and Natural Resources	Energy Conservation and Supply	Fuel economy
Environment and Public Works	Transportation	Emissions standards
Finance	International Trade	Foreign competition
Labor and Human Resources	Employment and Productivity	Auto industry employment
Small Business	Innovation and Technology	R&D, Suppliers
	Productivity and Competition	Dealers

8 of 17 Senate Committees

HOUSE

COMMITTEE	SUBCOMMITTEE	AREAS OF INTEREST
Appropriations	Transportation	DOT, DOE, and EPA budgets
Banking, Finance, and Urban Affairs	Consumer Affairs	Consumer protection
	International Trade, Investment, and Monetary Policy	Foreign competition
Education and Labor	Labor-Management Relations	Auto industry employment
Energy and Commerce	Commerce, Transportation, and Tourism	Fuel economy and safety
	Health and Environment	Emission standards
Government Operations	Environment, Energy and Natural Resources	Fuel economy, emissions
Public Works and Transportation	Surface Transportation	Highways
Science and Technology	Transportation, Aviation & Materials	Fuel economy, R&D, innovation
Small Business	Antitrust and Restraint of Trade	Dealers and suppliers
	Energy, Environment, and Safety	Fuel economy, emissions, and safety
Ways and Means	Trade	Foreign competition

9 of 22 House Committees

MAJOR POLICIES AFFECTING THE AUTOMOBILE TRANSPORTATION SYSTEM

Major Federal policies pertaining to the automobile transportation system are directed toward two general goals:

- assuring the economic and social benefits of the automobile as a means of personal transportation and goods movement,
- guarding against harmful effects that arise from automobile use.

The promotional role is the older and a direct outgrowth of a still older and more general interest of the Government in fostering the development of transportation. The adequacy of roads connecting the original thirteen States was a prime concern of the first Postmaster General, Benjamin Franklin. Direct Federal financing of roads, however, did not begin until 1823 when Congress appropriated funds for construction of parts of the Cumberland (National) Road. The first Federal aid for the express purpose of building highways for automobiles was authorized by Congress in 1916. Today, slightly over 20 percent of the 4 million miles of roads and street in the country have been built with some form of direct Federal aid.

Beginning about 20 years ago, growing public concern about adverse effects of the automobile led to requests for new policies and strategies, principally product regulations aimed first at improving vehicle safety and later at reducing air pollution and conserving petroleum. Congress responded by enacting a series of laws to regulate automobile performance with respect to crashworthiness, occupant protection, emissions, noise, and fuel economy. At the same time, Congress also passed legislation to protect the consumer in the purchase and resale of automobiles and in repair under warranty. As a result, the automobile is now one of the most extensively regulated products in our economy.

MAJOR POLICIES AFFECTING THE AUTOMOBILE TRANSPORTATION SYSTEM

TITLE	PROVISIONS
Energy	
Emergency Highway Energy Conservation Act of 1974 (PL 93-239)	Required states to reduce speed limit to 55 mph on all highways Provided for carpool demonstration projects Extended 55-mph speed limit indefinitely Granted standby authority for gasoline rationing Mandated new car fleet average fuel economy (27.5 mpg by 1985) Established program to develop and demonstrate electric or hybrid vehicles
Federal-Aid Highway Act Amendments of 1974 (PL 93-643)	
Energy Policy and Conservation Act of 1975 (PL 94-163)	
Electric and Hybrid Vehicle Research and Development Act of 1976 (PL 94-413)	
Energy Tax Act of 1978 (PL 95-618)	Established a gas guzzler tax on new cars with low fuel economy
Environment	
Department of Transportation Act of 1966 (PL 89-670)	Declared national policy to protect natural, recreational, and historic sites from intrusion by highways
National Environmental Policy Act of 1969 (PL 91-190)	Required assessment of environmental impacts of public works projects
Federal Highway Act of 1970 (PL 91-605)	Required development of guidelines to control adverse impacts of highways Required Federal-State cooperation for long-range highway planning
Uniform Relocation Assistance and Land Acquisition Policies Act of 1970 (PL 91-646)	Established uniform policies for land acquisition and treatment of persons displaced by highways
Clean Air Act of 1970 (PL 91-614) and 1977 Amendments (PL 95-95)	Established standards for CO, HC, and NOx emissions by new autos Required inspection and maintenance programs in certain urban areas
Noise Control Act of 1972 (PL 92-754)	Authorized establishment of noise standards for automobiles and other products
Safety	
National Traffic and Motor Vehicle Safety Act of 1966, and Amendments (PL 89-563)	Established National Highway Traffic Safety Administration (NHTSA) and set safety standards for motor vehicles
Highway Safety Act of 1966 (PL 89-564)	Required states to have a highway safety program
Motor Vehicle Information and Cost Savings Act of 1972 (PL 92-513)	Required use of energy-absorbing bumpers
Highway Safety Act of 1973 (PL 93-87)	Authorized Federal highway funds for safety programs and safety R&D
Highways and Mass Transportation	
Federal-Aid Highway Acts (1954-1976)	Appropriated funds for federally aided highway systems Provided for the National System of Interstate and Defense highways Authorized use of highway funds for certain mass transit improvements
Highway Revenue Act of 1956 (PL 85-823)	Imposed a Federal tax of 4 cents per gallon on motor fuel Established the Highway Trust Fund and "pay-as-you-build" principle
Urban Mass Transportation Act of 1964 (PL 88-365)	Encouraged areawide planning of mass transit facilities and provided financing for capital improvements and operating costs
Surface Transp. Assistance Act of 1982 (PL 97-424)	Federal tax on motor fuel raised to 9 cents per gallon, with revenues to be used for highway and mass transit improvements
Consumer Protection	
Motor Vehicle Information and Cost Savings Act of 1972 (PL 92-513)	Provided for demonstration projects and prohibited odometer tampering Required a consumer information study to examine crashworthiness
Magnuson-Moss Warranty Act of 1974 (PL 93-637)	Established auto warranty requirements and authorized the Federal Trade Commission to make rules on deceptive warranty practices

FEDERAL MOTOR VEHICLE SAFETY STANDARDS

Automotive safety has been a long-standing concern. As early as 1924, Secretary of Commerce Herbert Hoover convened the First National Conference on Street and Highway Safety. However, efforts then and for decades later were directed primarily to the safety of road design and construction, driver education, and traffic law enforcement. In 1966, with passage of the National Traffic and Motor Vehicle Safety Act, the emphasis shifted to include regulating the safety characteristics of motor vehicle design. In the past two decades, some 50 Federal Motor Vehicle Safety Standards have been adopted either to help prevent accidents or to improve occupant protection and automobile crashworthiness.

While some of the standards have been controversial and strongly resisted by the automobile industry and, at times, motorists themselves (e.g., the seat belt and ignition interlock), the net effect of safety regulation has been substantial reduction in traffic death and injury. The automobile fatality rate has been reduced from 27 deaths per 100,000 people in 1966 to 19 deaths in 1983. The reduction in the death rate per mile of travel is even more impressive — down from 5.3 deaths per 100 million vehicle miles in 1965 to 2.5 in 1984. The General Accounting Office estimated that the standards may have saved as many as 28,000 lives between 1966 and 1974 alone.

One of the most singularly effective safety laws has been the 55-mph national speed limit. Originally enacted as a fuel conservation measure, the speed limit has been shown to have major benefits in terms of lowering the accident rate, saving lives (2,000 to 4,000 per year), and reducing injury. The National Safety Council estimates that the 55-mph speed limit has saved 40,000 lives since 1973; NHTSA estimates 60,000. Along with the lower death rate has come reduction in the severity of injury. For example, paralyzing spinal injuries incurred in auto crashes are down 60 percent, due in large measure to the lower highway speeds. As a result, motor vehicle accidents are no longer the primary cause of spinal injury in the United States.

Perhaps the most controversial automobile safety standard has been the regulation that would require installation of passive restraints (automatic belts or air bags) in new passenger cars. Originally proposed for installation in model year 1979, passive restraints have been acrimoniously debated, and promulgation of the standard has been deferred repeatedly. In July 1983, the Secretary of Transportation announced a compromise that would require installation of passive restraints beginning with 10 percent of the 1987 model year production and with all new cars to be so equipped by 1990 unless States representing two-thirds of the population adopted mandatory seat belt use laws in the interim. As of August 1985, 14 States (New York, New Jersey, Illinois, Michigan, Texas, Nebraska, Missouri, North Carolina, Hawaii, New Mexico, Connecticut, Louisiana, Oklahoma, and Indiana) have responded by passing seat belt use laws. These States constitute nearly 40 percent of the U.S. population. Mandatory use legislation is pending in 14 other States.

FEDERAL MOTOR VEHICLE SAFETY STANDARDS (FMVSS)

FMVSS Number	Car	MPV	Truck	Bus	Equip.
100 SERIES Crash Avoidance					
101 Controls, Location & Identification	●	●	●	●	
102 Transmission Shift Lever Sequence	●	●	●	●	
103 Windshield Defrosting & Defogging	●	●	●	●	
104 Windshield Wiping & Washing System	●	●	●	●	
105 Hydraulic Brake System	●	●*	●*	●*	
106 Brake Hoses	●	●	●	●	●
107 Reflecting Surfaces	●	●	●	●	
108 Lights and Reflectors	●	●	●	●	●
109 New Tires for Passenger Cars (1)					●
110 Tire Selection & Wheels for Passenger Cars	●				
111 Rearview Mirrors	●	●	●	●	
112 Headlamp Concealment Devices	●	●	●	●	
113 Hood Latch System	●	●	●	●	
114 Theft Protection	●	●	●		
115 Vehicle Identification Number (Location)	●	●	●	●	
116 Hydraulic Brake Fluids	●	●	●	●	●
117 Retreaded Tires					●
118 Power Operated Window Systems	●	●			
119 New Tires for Trucks, Buses, etc					●
120 Tire Selection & Wheels for Trucks, Buses, etc		●	●	●	●
121 Air Brake Systems			●	●	
122 Motorcycle Brake Systems					
123 Motorcycle Controls, Displays					
124 Accelerator Control Systems	●	●	●	●	
125 Warning Devices					●
126 Truck–Camper Loading					●
200 SERIES Occupant Protection					
201 Occupant Protection in Interior Impacts	●	●*	●*	●*	
202 Head Restraints	●				
203 Steering Wheel Impact Protection	●	●*	●*	●*	
204 Steering System Rearward Movement	●	●*	●*	●*	
205 Glazing Materials	●	●	●	●	●
206 Door Locks & Hinges	●	●	●		
207 Anchorage of Seats	●	●	●	●	
208 Occupant Restraints	●	●	●	●	●
209 Seat Belt Assemblies (1)					●
210 Seat Belt Anchorages	●	●	●	●	

FMVSS/CFR Number	Car	MPV	Truck	Bus	Equip.
211 Wheel Nuts, Wheel Discs & Hub Caps	●	●			●
212 Windshield Mounting	●	●*	●*	●*	
213 Child Restraint System					●
214 Side Door Strength	●				
215 Exterior Protection	●				
216 Roof Crush Resistance	●*				
217 Bus Window Strength & Emergency Release				●	
218 Motorcycle Helmets					
219 Windshield Zone Intrusion	●	●*	●*	●*	
220 School Bus Rollover Protection				●*	
221 School Bus Body Joint Strength				●*	
222 School Bus Seats				●*	
300 SERIES Post Crash Protection					
301 Fuel System Integrity	●	●*	●*	●*	
302 Flammability of Interior Materials	●	●	●	●	
CFR PART NO.–Code of Federal Regulation (CFR) Parts					
— Importation of Motor Vehicles & Equip.	●	●	●	●	●
512 Confidential Business Information					
565 Vehicle Identification Number (Content)	●	●	●	●	
566 Manufacturers Identification	●	●	●	●	●
567 Certification	●	●	●	●	
568 Vehicles Manufactured in 2 or More Stages	●	●	●	●	
569 Regrooved Tires					●
570 Vehicles-In-Use Inspection	●	●	●	●	
572 Anthropomorphic Dummy (Test Equip.)					●
573 Defect Reports	●	●	●	●	
574 Tire Identification & Record Keeping	●	●	●	●	●
575 Consumer Information					
.101 Vehicle Stopping Distance	●				
.103 Truck Camper Loading			●		
.104 Uniform Tire Quality Grading					●
576 Record Retention	●	●	●	●	
577 Defect Notification	●	●	●	●	●
579 Defect & Non Compliance Responsibility	●	●	●	●	●
580 Mileage Reporting Requirements	●	●	●	●	
581 Bumper Standard	●				
582 Insurance Cost Information	●				

(1) Vehicle application is implied or is specified in other FMVSS.
* Applicability or requirements vary for specific vehicle types or GVWR.

PASSENGER CAR: Motor vehicle with motive power, except a multipurpose passenger vehicle, motorcycle or trailer designed for carrying 10 persons or less.
TRUCKS: Motor vehicle with motive power, except a trailer, designed primarily for the transportation of property or special purpose equipment.
BUS: Motor vehicle with motive power, except a trailer, designed for carrying more than 10 persons.
MULTIPURPOSE PASSENGER VEHICLE: Motor vehicle with motive power, except a trailer, designed to carry 10 persons or less which is constructed either on a truck chassis or with special features for occasional off-road operation.
EQUIPMENT: Individual vehicle components or systems whether installed on a new vehicle or provided as a replacement.

SOURCE: Compiled by Motor Vehicle Manufacturers Association of the U.S., Inc.

FEDERAL REGULATORY EMISSION-CONTROL REQUIREMENTS

Recognition of the automobile as a major source of air pollution dates back to the 1950s, when experimental studies by Haagen-Smit described the process by which automobile emissions accumulate in the atmosphere to produce smog. Although the extent of their effects on human health cannot be calculated with certainty and precision, most observers agree that the accumulation of carbon monoxide, hydrocarbons, and nitrogen oxides in the atmosphere is a serious hazard. The Clean Air Act of 1970 (PL 91-614) authorized the Environmental Protection Agency to promulgate standards for passenger cars and light trucks such that emissions of HC, CO and NOx from new cars and light trucks were to be reduced by 90 percent in comparison with 1970 vehicles. Originally the goal was to be attained by 1975 (1976 for NOx), but subsequent amendment of the Act deferred attainment to 1981 for passenger cars and 1985 for light trucks.

Nearly all of the cars on the road now are equipped with some form of emission control device. As a result, hydrocarbon and carbon monoxide emission levels have been reduced by 96 percent, relative to precontrol vehicles. Nitrogen oxide emissions have been reduced by 76 percent. Control of NOx emission has lagged because of the lack of an effective low-cost technology and the tight tradeoff between reducing NOx and increasing fuel economy. Despite these accomplishments, the automobile is still the largest producer of carbon monoxide in the environment, and a major source of hydrocarbons and nitrogen oxides. The chart below indicates the additional improvements that the manufacturers must make before 1988.

An important collateral emission control policy has been establishment of mandatory emission inspection and vehicle maintenance programs. Recent evidence from States and localities with annual inspection requirements indicates that emission control devices do not retain their effectiveness as long as manufacturers originally estimated, and perhaps as many as one-third of all new cars produced by foreign and domestic makers will fail to meet tailpipe standards within the first two years of operation. Improving the effectiveness and durability of emission-control technology is of great importance to manufacturers since they are liable for repair or replacement of equipment to bring their vehicles back into compliance.

Automobile exhaust has also been a major source of lead in the environment. Federal regulations require refineries to phase out the use of tetraethyl lead as an anti-knock additive in gasoline, and virtually all new cars are now designed to run on low-lead or no-lead fuel.

Federal Regulatory Emission Control Requirements[a]

	PASSENGER CARS				LIGHT DUTY TRUCKS[c]				HEAVY-DUTY TRUCKS[d]			
Model Year	HC GM/Mi	CO GM/Mi	NO_X GM/Mi[b]	Part. GM/Mi	HC GM/Mi	CO GM/Mi	NO_X GM/Mi	Part GM/Mi	HC GM/Mi	NO_X GM/Mi	$HC+NO_X$ GM/Mi	CO GM/Mi
'80	0.41	7.0	2.0	—	1.7	18.0	2.3	—	1.5	—	10.0	25.0
'81	0.41	3.4	1.0	—	1.7	18.0	2.3	—	1.5	—	10.0	25.0
'82	0.41	3.4	1.0	0.6	1.7	18.0	2.3	0.6	1.5	—	10.0	25.0
'83	0.41	3.4	1.0	0.6	1.7	18.0	2.3	0.6	1.5	—	10.0	25.0
'84	0.41	3.4	1.0	0.6	0.8	10.0	2.3	0.6	1.5	10.7	—	25.0
'85	0.41	3.4	1.0	0.6	0.8	10.0	2.3	0.6	2.5	10.7	—	40.0
'86	0.41	3.4	1.0	0.6	0.8	10.0	2.3	0.26	1.9	10.6	—	37.1
'87	0.41	3.4	1.0	0.2	0.8	10.0	2.3	0.26	N.A.	N.A.	—	N.A.

a—California standards not included. All standards apply to gasoline and diesel vehicles except particulate, which applies only to diesel. *b*—Oxides of nitrogen standard could be waived to 1.5 gpm for diesel engines, up to 2.0 gpm for American Motors Corp. *c*—Trucks 6,000 GVW and under classed as light-duty in model years '76-'78, trucks 8,500 GVW and under classed as light-duty starting in '79. *d*—For '79-'84 heavy-duty trucks, EPA adopted optional standards of 25.0 gm bhph for CO and 5.0 gm bhph for $HC-NO_X$, truckmakers could meet the revised levels by applying more stringent test procedures. During 1984 truckmakers were granted an extra two years grace on adopting the more stringent emissions testing procedure, which was moved up to '87, but the standards nonetheless were higher in '85. Abbreviations include: **HC**—hydrocarbons; **CO**—carbon monoxide; **NO_X**—Oxides of nitrogen; **Part.**—diesel particulates; **$HCNO_X$**—hydrocarbons and oxides of nitrogen; **GM/Mi**—grams per mile.

FEDERAL FUEL-ECONOMY STANDARDS

In response to the 1973 OPEC oil embargo and concern about the economic and strategic implications of our growing dependence on foreign suppliers, Congress passed the Energy Policy and Conservation Act (PL 94-163). Among the provisions of EPCA were fuel-economy standards for new passenger cars in model years 1978 through 1985. Compliance is measured in terms of the sales-weighted average fuel economy of all cars sold by each manufacturer in a given model year — known as Corporate Average Fuel Economy (CAFE). EPCA provides for fines to be levied against all cars sold by a manufacturer in the amount of $5 for each 0.1 mpg that CAFE falls below standard in any model year. Exceeding the standard entitles the manufacturer to "credits" which can be carried forward to offset fines that may be incurred in later years. In a later amendment to the Act, manufacturers also gained "carry-back" privileges, allowing them to defer payment of fines in anticipation of exceeding the standard in the future.

The graph below charts the fuel economy achieved by domestic and imported cars through 1984. Domestic firms were able to meet or exceed standards until 1982 and were confidently predicting a CAFE of at least 27.5 mpg and perhaps as high as 30 mpg by 1985. In 1983 and 1984, however, a decline in fuel prices and an accompanying shift of consumer preference to larger, less fuel-efficient cars produced substantial shortfalls. In 1984, for example, domestic cars averaged 1.6 mpg below standard. On a combined sales volume of 6.6 million units for Ford and GM, this translates into penalties of $800 million, although half is offset by carry-forward credits from 1981-1983. The expectation at the beginning of 1985 was that the CAFE of both Ford and GM would fall about 2 mpg below the standard of 27.5 mpg for the model year, subjecting them to fines on the order of $700 million.

The graph also shows that imports, largely Japanese subcompacts, attain an average fuel economy in excess of 30 mpg. As a result, the aggregate fuel economy of all new cars (the middle line on the graph) has been above standard in all years except 1984, when it dipped 0.3 mpg below the mandated 27.0 mpg. Thus, if the purpose of EPCA is broadly construed to be raising the fuel efficiency of new cars sold in this country to roughly double what it was at the time standards were established, EPCA has succeeded. However, EPCA was expressly aimed at pushing domestic manufacturers to increase the fuel economy of their products to at least 27.5 mpg — an expectation that clearly was not going to be met by 1985.

Federal Regulatory Emission Control Requirements[a]

	PASSENGER CARS				LIGHT DUTY TRUCKS[c]				HEAVY-DUTY TRUCKS[d]			
Model Year	HC GM/Mi	CO GM/Mi	NO_x GM/Mi[b]	Part. GM/Mi	HC GM/Mi	CO GM/Mi	NO_x GM/Mi	Part GM/Mi	HC GM/Mi	NO_x GM/Mi	$HC+NO_x$ GM/Mi	CO GM/Mi
'80	0.41	7.0	2.0	—	1.7	18.0	2.3	—	1.5	—	10.0	25.0
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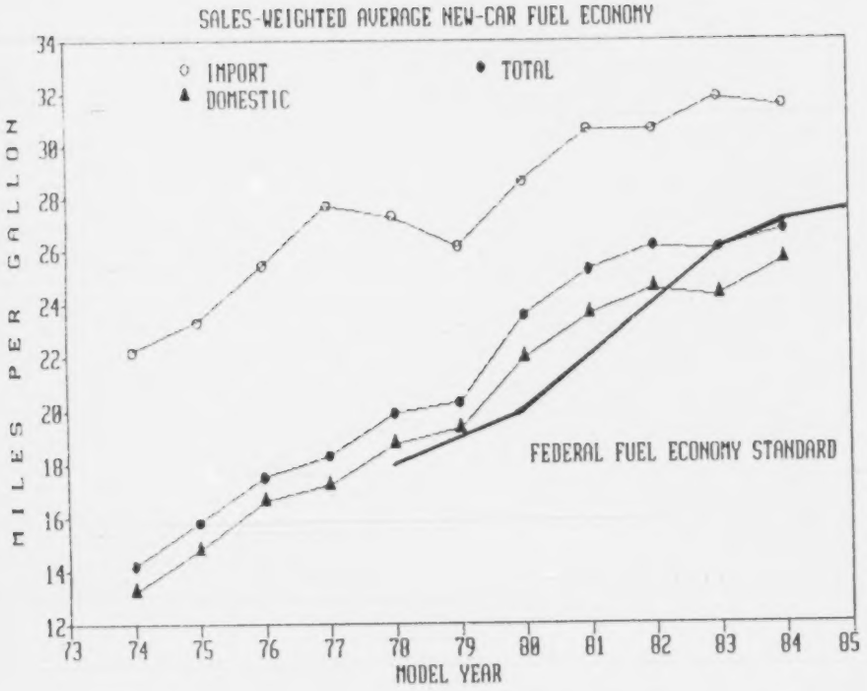
'83	0.41	3.4	1.0	0.6	1.7	18.0	2.3	0.6	1.5	—	10.0	25.0
'84	0.41	3.4	1.0	0.6	0.8	10.0	2.3	0.6	1.5	10.7	—	25.0
'85	0.41	3.4	1.0	0.6	0.8	10.0	2.3	0.6	2.5	10.7	—	40.0
'86	0.41	3.4	1.0	0.6	0.8	10.0	2.3	0.26	1.9	10.6	—	37.1
'87	0.41	3.4	1.0	0.2	0.8	10.0	2.3	0.26	N.A.	N.A.	—	N.A.

a—California standards not included. All standards apply to gasoline and diesel vehicles except particulate, which applies only to diesel. *b*—Oxides of nitrogen standard could be waved to 1.5 gpm for diesel engines, up to 2.0 gpm for American Motors Corp. *c*—Trucks 6,000 GVW and under classed as light-duty in model years '76-'78; trucks 8,500 GVW and under classed as light-duty starting in '79. *d*—For '79-'84 heavy-duty trucks, EPA adopted optional standards of 25.0 gm/bhph for CO and 5.0 gm/bhph for $HC-NO_x$; truckmakers could meet the revised levels by applying more stringent test procedures. During 1984 truckmakers were granted an extra two years grace on adopting the more stringent emissions testing procedure, which was moved up to '87, but the standards nonetheless were higher in '85. Abbreviations include: **HC**—hydrocarbons; **CO**—carbon monoxide; **NO_x**—Oxides of nitrogen; **Part.**—diesel particulates; **$HCNO_x$**—hydrocarbons and oxides of nitrogen; **GM/Mi**—grams per mile.



NEW CAR – 50 STATE CORPORATE
AVERAGE FUEL ECONOMY CITY/HIGHWAY
MILES PER GALLON RATING

Model Year	Federal Standard	Domestic	Import	Total
1974	None	13.2	22.2	14.2
1975	None	14.8	23.3	15.8
1976	None	16.6	25.4	17.5
1977	None	17.2	27.7	18.3
1978	18.0	18.7	27.3	19.9
1979	19.0	19.3	26.1	20.3
1980	20.0	21.9	28.6	23.5
1981	22.0	23.5	30.6	25.2
1982	24.0	24.5	30.6	26.1
1983	26.0	24.2	31.8	26.0
1984	27.0	25.4	31.5	26.7
1985	27.5			

*After 1979, domestic fleet does not include any domestic sponsored imports

SOURCE U.S. Department of Transportation and published and unpublished data from Environmental Protection Agency

CORPORATE AVERAGE FUEL ECONOMY FOR INDIVIDUAL MANUFACTURERS

From the table below, it can be seen that there are huge differences among the CAFE ratings achieved by domestic and foreign automakers. Among U.S. firms, American Motors and Chrysler have consistently met or exceeded the standards — AMC by a substantial amount in 1983 and 1984. Ford and GM performed well until 1982, but their CAFE fell significantly below standard in 1983 and 1984. Most foreign manufacturers have been in the range of 29-34 mpg in recent years, but there are exceptions — MG-Triumph-Jaguar at 19.0 mpg and Peugeot at 24.5 mpg for 1984. All major Japanese firms exporting to the United States (Toyota, Nissan, Honda, Subaru, Toyo Kogyo, and Isuzu) are at least 2 mpg above the 1984 standard of 27.0 mpg, and Honda tops the list of all foreign and domestic makers with 35.3 mpg.

MANUFACTURER'S NEW CAR CORPORATE AVERAGE FUEL ECONOMY CITY/HIGHWAY MILES PER GALLON RATING

	Actual Sales Basis							Projected Sales Basis			
Manufacturer	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
American Motors	16.3	18.2	18.4	18.9	18.6	19.9	21.5	22.4	23.9	33.5	35.2
Chrysler Corp.	13.9	15.0	16.3	16.3	18.4	20.5	21.7	26.1	27.2	27.0	27.0
Ford Motor Co.	14.2	13.9	16.6	16.5	18.4	19.2	22.1	23.3	24.5	23.8	25.8
General Motors	12.1	15.1	16.6	18.2	19.0	19.1	21.9	23.2	24.1	23.5	24.7
VW-Audi-Porsche	25.9	26.5	27.5	28.8	27.2	28.6	30.8	34.2	32.9	30.2	29.0
Toyota	22.5	21.8	25.0	28.5	26.8	24.0	27.4	30.9	30.5	33.3	33.5
Nissan (Datsun)	24.0	25.0	27.0	27.0	26.8	26.8	31.2	30.5	30.7	32.6	32.6
Honda	31.1	31.4	32.6	35.4	33.7	29.0	29.2	30.8	33.4	35.4	35.3
Fuji (Subaru)	25.7	26.4	29.7	29.9	29.4	29.0	27.9	31.2	31.6	33.7	33.3
Toyo Kogyo (Mazda)	13.6	17.1	21.9	29.3	35.5	25.6	26.0	31.1	29.4	29.1	29.1
Fiat-Lancia	21.8	22.7	22.9	23.8	21.7	26.4	26.6	27.6	25.7	13.1	–
Volvo	19.4	18.5	19.3	19.7	21.2	21.0	21.6	22.3	24.6	25.8	26.4
Mercedes-Benz	15.3	17.3	18.6	19.2	19.2	20.5	23.9	25.6	26.3	26.6	26.5
MG-TR-Jaguar	21.3	21.0	20.5	22.3	21.1	21.2	20.8	18.5	18.8	18.8	19.0
BMW	19.5	17.8	18.8	20.3	19.7	20.1	25.9	26.6	26.4	25.6	27.8
Saab	19.8	23.0	22.8	23.7	22.7	21.7	23.4	23.3	24.1	25.8	25.3
Peugeot	19.0	23.8	22.2	25.9	24.8	23.8	27.2	27.9	27.6	25.1	24.5
Renault	–	–	–	–	30.4	30.3	33.3	29.4	32.4	31.4	33.4
Isuzu	–	–	–	–	–	–	–	34.7	37.6	34.1	29.3

SOURCE: Compiled by the Motor Vehicle Manufacturers Association of the U.S. from various sources.

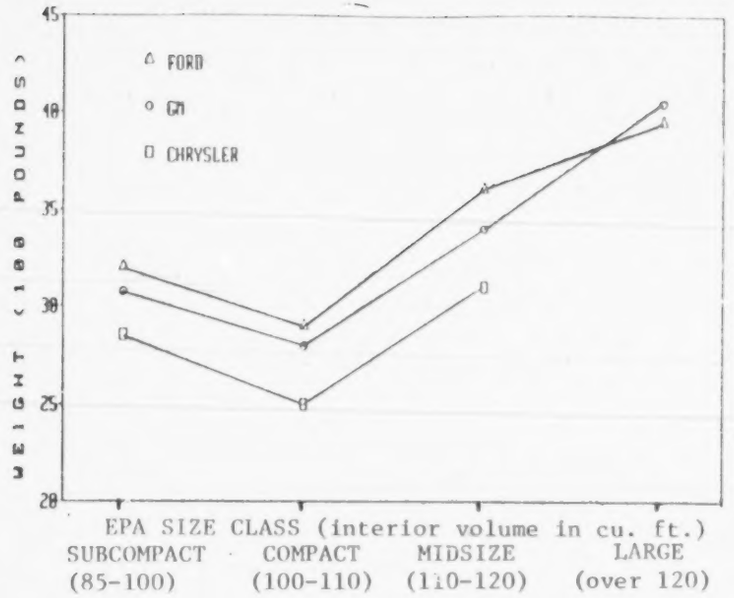
DIFFERENCES IN WEIGHT AND FUEL ECONOMY AMONG THE BIG THREE U.S. AUTOMAKERS

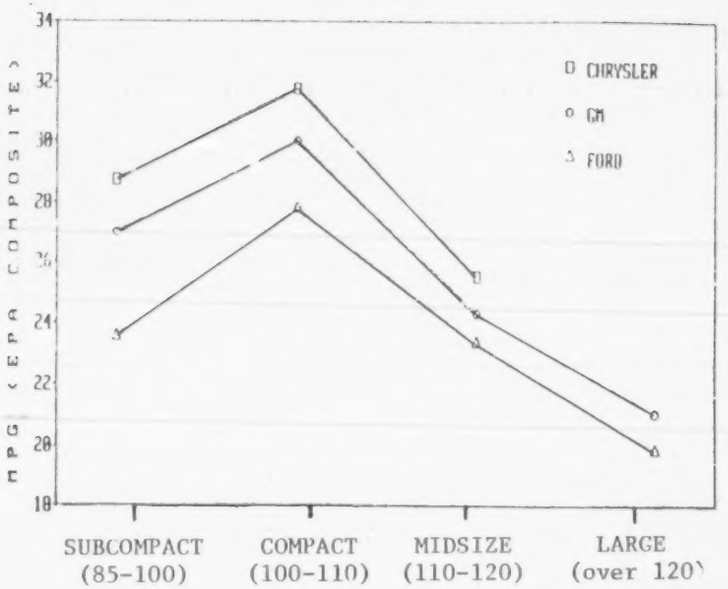
An interesting perspective on the reason for differences among the Big Three U.S. automakers is afforded in an analysis performed by the U.S. Department of Energy (see below).

In each of the size classes where Chrysler has models competing directly with GM and Ford (subcompact, compact, and midsize), Chrysler's cars weigh less.* This translates almost directly into higher fuel economy. Chrysler's cars typically have a 2-mpg advantage over comparable GM models. The Chrysler advantage over Ford ranges from 5.5 mpg for subcompacts to 4 mpg for compacts and 2 mpg for midsize models.

Thus, the shift of consumer preference toward midsize cars since 1982 is only partly responsible for the shortfall in GM's and Ford's CAFE ratings. The cars that they market in the subcompact, compact, and midsize classes are heavier and less fuel-efficient than those of Chrysler. The table at the bottom of the page below is a hypothetical illustration of the CAFE ratings that would have resulted if GM and Ford sold cars with fuel economy equivalent to Chrysler's. GM, with its present mix of sales in each size class but with Chrysler's cars substituted for its own, would have attained 24.9 mpg instead of 24.4 mpg in model year 1984. Ford, with Chrysler's cars in place of its own, would have benefited even more — achieving 27.4 mpg instead of 25.3 mpg. Conversely, Chrysler selling either GM or Ford cars would have had a CAFE of 25.4 or 23.8 mpg respectively. Generally speaking, the table shows that the differences in CAFE attributable to sales mix are less than those attributable to the fuel-saving technology embodied in the products of each manufacturer.

* The size classes are those established by EPA based on interior volume: subcompact (85-100 cu. ft.), compact (100-110 cu. ft.), medium (110-120 cu. ft.), and large (over 120 cu. ft.). Chrysler does not market cars in the EPA large class.





EPA NEW CAR FUEL ECONOMY ESTIMATES FOR THE BIG THREE WITH THE SIZE MIX AND PRODUCTS OF OTHER MANUFACTURERS. MODEL YEAR 1984

		WITH CARS OF...		
		GM	FORD	CHRYSLER
SIZE MIX OF...	GM	24.4	23.2	24.9
	FORD	25.3	25.0	27.4
	CHRYSLER	25.4	23.8	26.8

SOURCE: U.S. Department of Energy, Monthly Data Report #14, February 1984

RECENT REVISIONS IN EPA FUEL-ECONOMY RATINGS AND CAFE STANDARDS

Faced with criminal penalties for noncompliance and civil fines amounting to almost $750 million in 1985 and $1.14 billion overall for model years 1983-1985, General Motors and Ford sought two forms of relief from the Federal Government. Through the courts, they asked to have EPA examine the effects of changes made in fuel-economy test procedures since 1979 and to adjust their ratings for model year 1980 and thereafter. They also petitioned NHTSA for administrative action to roll back the CAFE standard for 1986 and subsequent model years.

In August 1985, EPA announced that, as a result of revisions in test procedures (chiefly those pertaining to inertia weight categories and fuel and lubricant properties), domestic and foreign manufacturers were entitled to credits ranging from 0.4 to 0.8 mpg per vehicle per year from 1980 onward. Using the carry-forward provisions of EPCA, Ford and GM could reduce their penalties for 1983-1984 shortfalls and those anticipated for 1985. Thus, GM entered the 1985 model year with a negative balance of $42 million instead of the $360 million that they faced before the EPA action. Ford's position shifted from a negative balance of $40 million to a credit of $80 million — a swing of $120 million. Ford and GM combined still face penalties on the order of $580 million for projected shortfalls in 1985 even with the credits they expect to gain by the revised EPA ratings.

The administrative decision by NHTSA to reduce the 1986 CAFE standard to 26.0 mpg on the grounds that Ford and GM "will not be able to meet the 27.5 standard without severe adverse economic consequences" eases the longer-term situation since it brings the mandated level of fuel-economy fairly close to what the new-car market appears to demand. It may also help Ford and GM avert payment of fines for 1985 if, in the years 1986-1988, they can exceed 26.0 mpg and apply the credits as carry-backs to offset the shortfalls expected in 1985. With the EPA adjustments applied, GM may attain 25.6 and Ford 26.1 mpg in model year 1985, for which the standard remains at 27.5 mpg. This would amount to penalties of $456 million for GM and $123 million for Ford. With no carry-forward credit remaining for the years before 1985, GM would have to attain at least 26.7 mpg for each of the years 1986-1988 (assuming that the standard stays at 26.0 mpg). Ford, by virtue of available carry-forward credits from 1982-1984, will enter the 1986 model year $43 million in arrears and need do no more than exceed the CAFE standard by 0.2 mpg in any one of the three years 1986-1988 and meet it in the other two in order to break even. Chrysler has strongly objected to lowering the post-1985 standard on the grounds that it jeopardizes the large investments Chrysler has made in order to comply with the law and adversely affects their ability to compete in the market for midsize and large cars, where the position of GM and Ford will be strengthened.

EFFECTS OF EPA ADJUSTMENT OF GM AND FORD FUEL-ECONOMY RATINGS, 1980-85

		UNADJUSTED			ADJUSTED		
	CAFE Standard mpg	CAFE Rating mpg	Over (Under) mpg	Credit (Penalty) $ million	CAFE Rating mpg	Over (Under) mpg	Credit (Penalty) $ Million
General Motors:							
1980	20.0	21.9	1.9	428	22.6	2.6	585
1981	22.0	23.2	1.2	240	23.8	1.8	360
1982	24.0	24.2	0.2	34	24.6	0.6	102
1983	26.0	23.5	(2.5)	(438)	24.0	(2.0)	(350)
1984	27.0	24.4	(2.6)	(624)	24.9	(2.1)	(504)
1985	27.5	25.1*	(2.4)	(576)	25.6*	(1.9)	(456)
Cumulative Credit (Penalty)**							
1980-84				(360)			(42)
1980-85				(936)			(498)
Ford:							
1980	20.0	22.1	2.1	147	22.9	2.9	203
1981	22.0	23.4	1.4	95	24.1	2.1	143
1982	24.0	24.6	0.6	41	25.0	1.0	69
1983	26.0	23.8	(2.2)	(141)	24.3	(1.7)	(109)
1984	27.0	25.0*	(2.0)	(176)	25.5*	(1.5)	(132)
1985	27.5	25.6*	(1.9)	(167)	26.1*	(1.4)	(123)
Cumulative Credit (Penalty)**							
1980-84				(40)			80
1980-85				(207)			(43)

* Not yet confirmed by EPA, estimated from manufacturer's data.
** Carry-forward credit is limited to the three previous years.

Source: OTA, based on EPA data

THE GAS GUZZLER TAX

A companion to EPCA in the overall Federal strategy of technology forcing is the Gas Guzzler Tax (PL 95-618), which is designed to work precisely in that part of the fuel-economy spectrum where the greatest saving in actual fuel consumption can be achieved. Raising the fuel economy of a larger car from 20 to 25 mpg saves about 100 gallons of gasoline per year (based on average driving) and has a larger effect on CAFE than increasing the fuel economy of a smaller car from 25 to 30 mpg, which saves 67 gallons per year. The tax, by its progressive nature, acts to raise the floor under the fuel economy of the new-car fleet by discouraging sales of less efficient models and so counterbalances the effect of lower gasoline prices. Since the taxes rise sharply through 1986, manufacturers electing not to replace their present large cars with more fuel-efficient models will either have to pass the tax along to purchasers and lose sales, or absorb it themselves and lose profits. Either way, the gas guzzler tax provides a strong incentive to full-line automakers like GM and Ford to improve the fuel economy of their midsize and large models.* Thus, Ford's Crown Victoria and GM's Cadillac De Ville, each with 17 mpg, were taxed as gas guzzlers at a rate of $500 in 1983 and $750 in 1984. The tax on these cars will be $1,500 in 1986. The midsize Ford LTD (22 mpg) will be subject to a tax of $500 in 1986. The 1986 gas guzzler tax on the Oldsmobile Cutlass Supreme (21 mpg) will be $650.

* Revenues from the gas guzzler tax have doubled in each of the past three years — $1.7 million in 1982, $4.0 million in 1983, and $8.8 million in 1984.

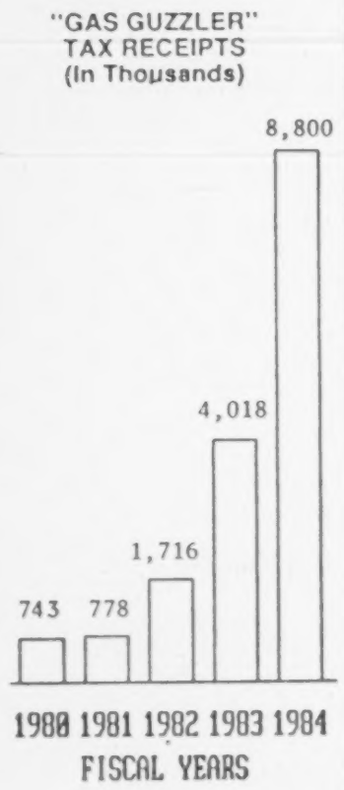
GAS GUZZLER TAX, ENERGY TAX ACT OF 1978

Miles per Gallon* At Least—Less Than	1980	1981	1982	1983	1984	1985	1986
0-12.5	$550	$650	$1,200	$1,550	$2,150	$2,650	$3,850
12.5-13.0	550	650	950	1,550	1,750	2,650	3,200
13.0-13.5	300	550	950	1,250	1,750	2,200	3,200
13.5-14.0	300	550	750	1,250	1,450	2,200	2,700
14.0-14.5	200	450	750	1,000	1,450	1,800	2,700
14.5-15.0	200	450	600	1,000	1,150	1,800	2,250
15.0-15.5	0	350	600	800	1,150	1,500	2,250
15.5-16.0	0	350	450	800	950	1,500	1,850
16.0-16.5	0	200	450	650	950	1,200	1,850
16.5-17.0	0	200	350	650	750	1,200	1,500
17.0-17.5	0	0	350	500	750	1,000	1,500
17.5-18.0	0	0	200	500	600	1,000	1,300
18.0-18.5	0	0	200	350	600	800	1,300
18.5-19.0	0	0	0	350	450	800	1,050
19.0-19.5	0	0	0	0	450	600	1,050
19.5-20.0	0	0	0	0	0	600	850
20.0-20.5	0	0	0	0	0	500	850
20.5-21.0	0	0	0	0	0	500	650
21.0-21.5	0	0	0	0	0	0	650
21.5-22.0	0	0	0	0	0	0	500
22.0-22.5	0	0	0	0	0	0	500
22.5-	0	0	0	0	0	0	0

Note: New car purchaser pays tax if car's combined city/highway fuel economy rating is significantly, generally 5 mpg, below the standard for that year.

*Combined City/Highway rating

SOURCE: Energy Tax Act of 1978, Public Law 95-618, Gas Guzzler Tax



FACTORS AFFECTING THE DEMAND FOR FUEL ECONOMY

THE COST OF GASOLINE

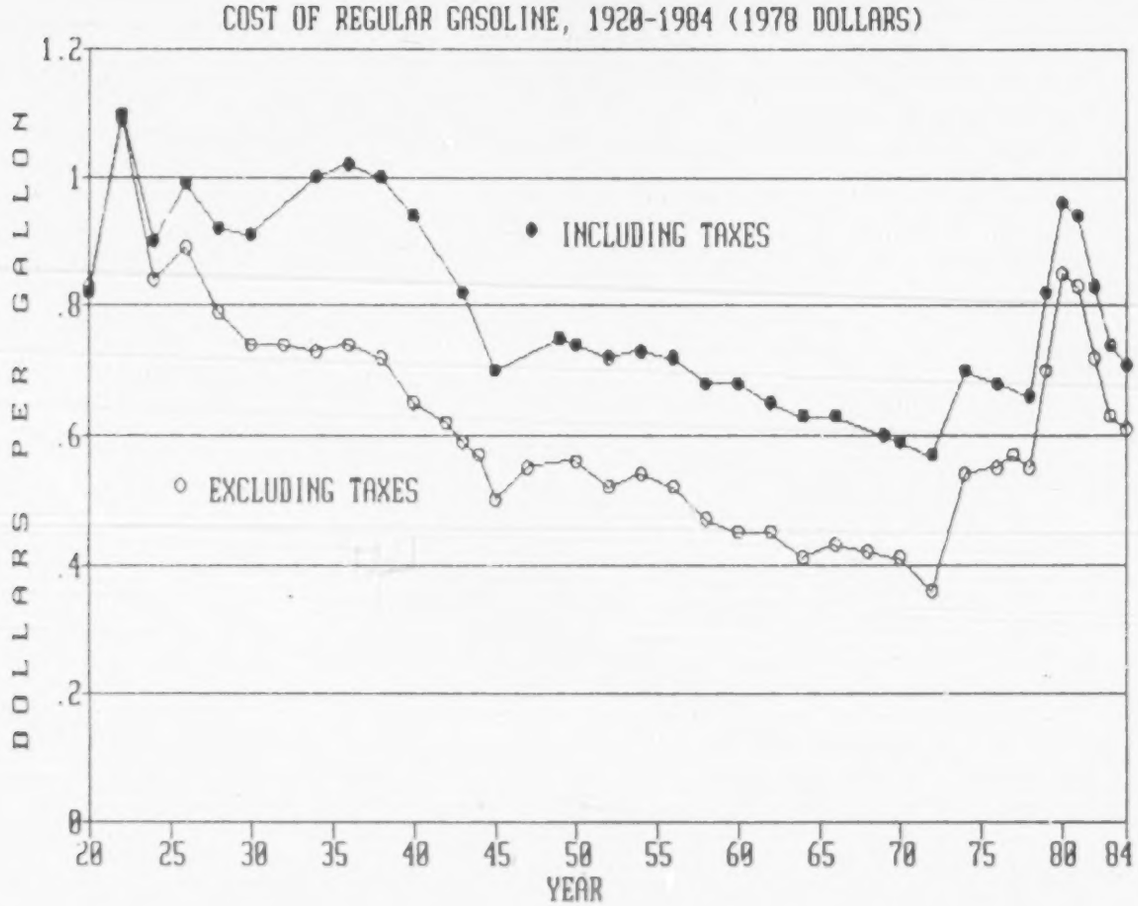
Fuel economy became an important factor in new-car purchases when the price of gasoline rose sharply as a result of the OPEC embargo in 1973-74 and then again with the collapse of Iranian oil production in 1979. Two perceptions appeared to govern consumer thinking: the price of gasoline was high and rising, and the supply was uncertain.

Developments in the petroleum market since 1979 have weakened the correctness of both perceptions. There is presently an excess of petroleum supply in the world market, and prices have dropped accordingly. Equally important, the overall rise in the price of petroleum has been largely offset by inflation.

The graph below shows the long-term trend in the price of gasoline, plotted in constant 1978 dollars. The price hikes of 1973-74 and 1979 show clearly as sharp inflections of the curve, but they are followed by almost equally steep declines. By the end of 1984, the price of gasoline was at about the same level as in 1952. Over the longer term, the price of gasoline in 1984 was considerably cheaper than in the 1920s and 1930s, a period of great expansion in automobile ownership and use.

Note also that the fraction of pump price represented by Federal, State, and local taxes has varied considerably over the years. Between 1932 (the first year gasoline was taxed by the Federal Government) and 1974, taxes in current dollars rose from 5.4 to 11.0 cents per gallon, most of which was State and local tax.* In constant dollars, the sum of taxes levied by all jurisdictions changed very little. However, because of the declining real price of gasoline, taxes represented an increasing share of total price, accounting for about one-third of the pump price by 1973, immediately before the OPEC embargo. Despite the rise in Federal tax to 9 cents per gallon (up from the 4 cents per gallon that had prevailed since 1959) and similar increases at the State level, gasoline taxes today are relatively small in constant-dollar terms. Taxes now represent about 13 percent of pump price, roughly the same fraction as in 1929.

* Federal taxes (per gallon) were as follows: 1 cent, effective June 21, 1932; 1.5 cents, June 17, 1933; 1 cent, January 1, 1934; 1.5 cents, July 1, 1940; 2 cents, November 1, 1951; 3 cents, June 30, 1956; 4 cents, October 1, 1959; and 9 cents, April 1, 1983.



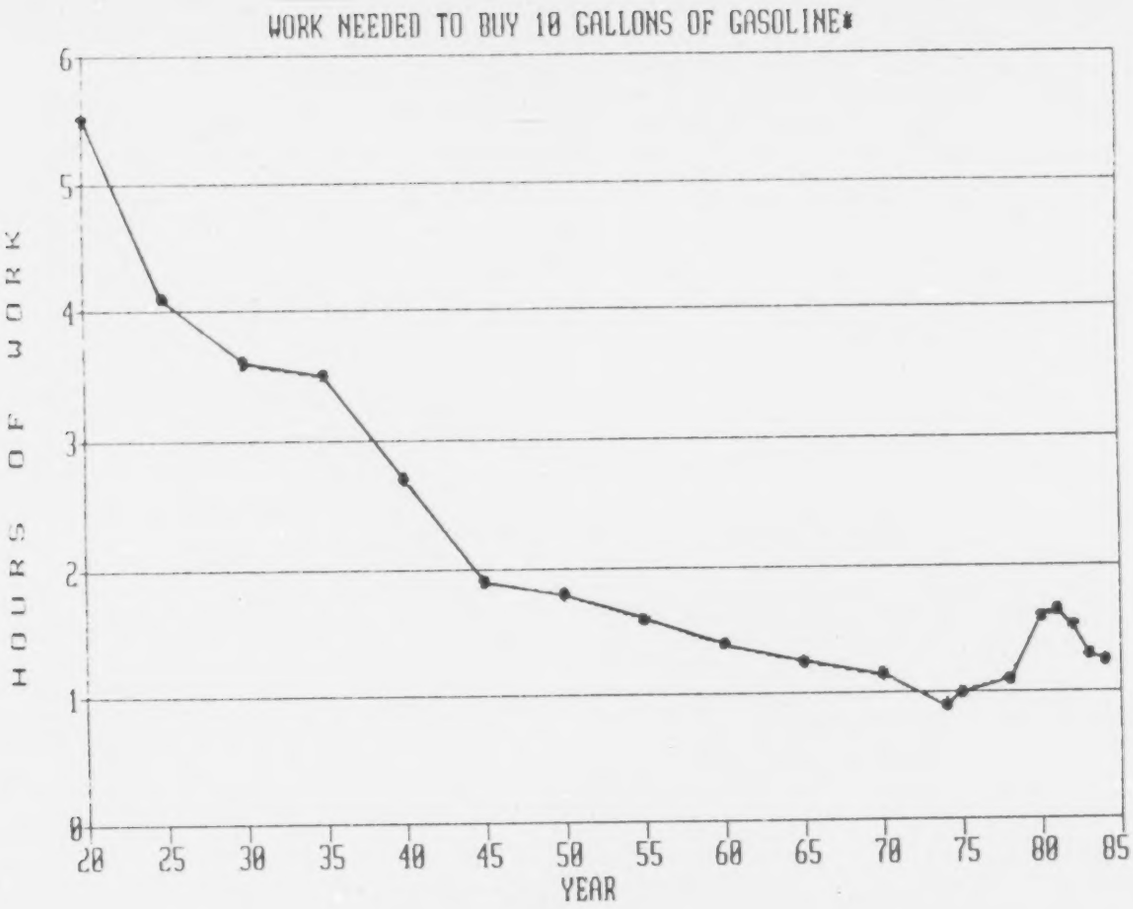
SOURCE: Gasoline prices: 1920-1956, Texaco Inc. (Based on 50 representative cities); 1956-1983, Platt's Oil Price Handbook and Oilmanac. Taxes and price indices: U.S. Bureau of Labor Statistics.

WORK NEEDED TO BUY 10 GALLONS OF GASOLINE

The price of gasoline alone does not account for consumers' perception of the cost of travel. Disposable income also has an influence. The graph below is an expression of the price of gasoline in terms of the average hourly wage of workers in all manufacturing industries.

Between 1920 and 1974, the hours of work needed to purchase 10 gallons of gasoline dropped almost 85 percent — from 5 hours and 30 minutes in 1920 to 55 minutes in 1974. Wage and salary increases during this period, combined with steadily falling gasoline prices enabled more and more people to afford to operate an automobile and contributed significantly to the rise of automobile ownership in all segments of society.

The upturn of the graph between 1974 and 1980, due almost wholly to increases in the price of gasoline but also reflecting the loss of earning power because of the high inflation of that time, was followed by an almost equal downturn. At the high point of the past decade (1981), the work needed to buy 10 gallons of gasoline was roughly the same as in 1953. It is now at about the 1965 level and still falling.



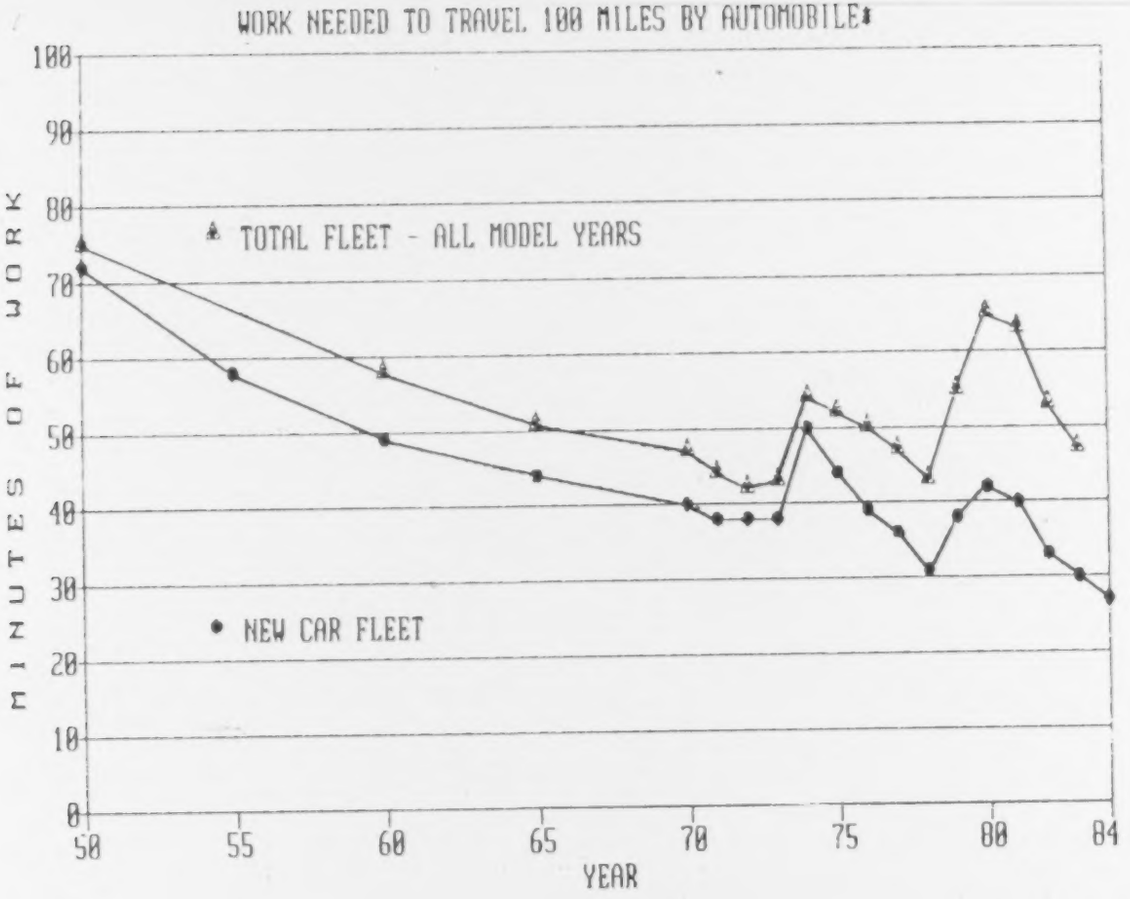
* based on the ratio of the pump price of regular gasoline to the average hourly wage of workers in all manufacturing industries.

SOURCE: Gasoline prices: Texaco Inc. (1920-1956), Platt's Oil Price Handbook and Oilmanac (1956-1984). Wages: U.S. Bureau of Labor Statistics.

WORK NEEDED TO TRAVEL 100 MILES BY AUTOMOBILE

An indication of the trend in the real cost of travel is provided below. Although the rise of petroleum prices between 1974 and 1980 meant that motorists had to pay more for a given amount of gasoline, there were offsetting improvements in passenger-car fuel economy. In terms of the fuel cost to travel 100 miles, motorists today pay about the same fraction of their hourly wage as in 1970. Considering that the average one-way trip to work is about 9 miles, the typical wage earner works no more than 45 minutes to pay the weekly gasoline bill for commuting. For those with 1984 model cars, the cost of travel has never been lower. They have to work less than 30 minutes to buy the gasoline for 100 miles of travel.

This graph and the two preceding help explain why, in the present market, fuel economy exerts a weak influence on consumers' choice of the cars they drive.



* based on the pump price of regular gasoline, average hourly wage of workers in all manufacturing industries, and average new-car and fleet fuel economy.

SOURCE: Gasoline prices: Texaco Inc. (1920-1956), Platt's Oil Price Handbook and Oilmanac (1956-1984). Wages: U.S. Bureau of Labor Statistics. Passenger car fuel economy: M.V.M.A. Motor Vehicle Facts and Figures and U.S. Department of Transportation published and unpublished data.

BEST SELLING DOMESTIC CARS

The accompanying table lists the 20 most popular domestic models in 1984. Collectively, they accounted for about 56 percent of all domestic cars sold and about 43 percent of all new car purchases. Some versions of four of these models, including the two best-selling, attained the 27-mpg standard for 1984. Most, however, were far below standard. All or some versions of seven other models were subject to a gas guzzler tax, which in 1984 applied to models attaining less than 19.5 miles per gallon. The sales weighted fuel economy for the twenty best selling automobiles was 22.4 mpg. - 4.6 mpg. below the 1984 CAFE standard.

Consumer preference for larger, less fuel-efficient cars is also clear in the size mix of the top 20 passenger cars. Thirteen — roughly two-thirds — are either midsize or large according to the EPA size classification system. In comparison with the 1984 domestic car market as a whole, the top 20 had proportionately fewer small models (subcompacts and compacts) and more large and luxury models. Thus, the top 20, even more than the domestic new-car market as a whole, was not a small-car market.

BEST SELLING DOMESTIC CARS, JANUARY - DECEMBER 1984

MODEL	MAKER	SIZE CLASS[a]	UNITS SOLD	MPG[b]
Chevrolet Cavalier	GM	Subcompact	377,446	27[c]
Ford Escort	FORD	Compact	353,578	27[c]
Chevrolet Celebrity	GM	Midsize	322,198	25
Olds Cutlass Supreme	GM	Midsize	302,087	21
Chev. Caprice/Impala	GM	Large	258,902	18[d]
Olds 88	GM	Large	258,297	19
Ford Tempo	FORD	Compact	256,532	26[c]
Olds Cutlass Ciera	GM	Midsize	242,209	23
Buick Century	GM	Midsize	217,042	23
Chevrolet Camaro	GM	Subcompact	202,172	20[d]
Ford LTD	FORD	Midsize	196,907	22
Cadillac Deville	GM	Large	195,177	17
Buick Regal	GM	Midsize	182,185	20
Ford Crown Victoria	FORD	Large	169,253	17
Chevrolet Chevette	GM	Subcompact	164,917	30[c]
Buick LeSabre	GM	Large	164,314	18
Ford Thunderbird	FORD	Compact	154,865	20
Mercury Gran Marquis	FORD	Large	143,594	17
Ford Mustang	FORD	Compact	138,296	23
Plymouth Reliant	CHRYSLER	Midsize	138,154	26[c]

a. EPA size class, based on interior volume.
b. Fuel economy varies for different models, depending on engine size and transmission.
c. Some models meet or exceed the 1984 CAFE standard.
d. Some models are subject to a gas guzzler tax.

SOURCE: Automotive News

PROFILE OF THE AUTOMOBILE INDUSTRY

TRENDS IN WORLD CAR PRODUCTION

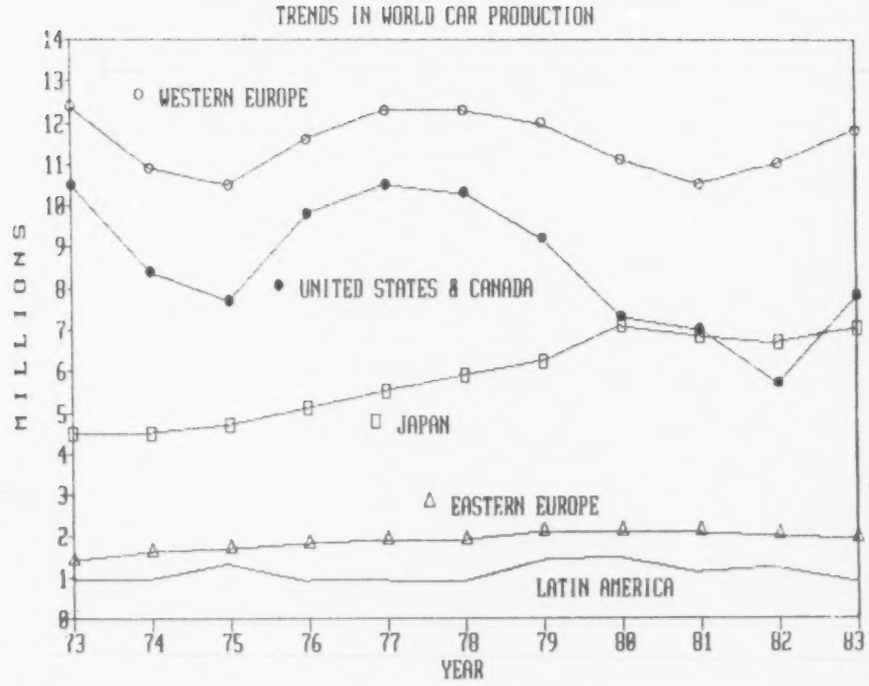
The automobile industry in the United States and Canada suffered a severe decline between 1977 and 1982. Much of this decline, amounting to a 46-percent drop in six years, can be attributed to general economic conditions, but aggressive marketing by Japanese firms was also an important factor. Oil shortages and high fuel prices led to a stronger demand for more fuel-efficient automobiles — products that the Japanese were ideally positioned to supply. In 1983, however, with economic recovery and reduction in the real cost of gasoline, consumers began to buy larger, more powerful models again, and sales took a sharp upturn.

Thus, while production and profitability of U.S. and Western European manufacturers fell and rose with the economic cycle, the Japanese sustained, and even increased, their sales by a marketing strategy that exploited their advantage of lower unit manufacturing costs. The accompanying chart shows how increases in Japan's level of production occurred at the time when the U.S. and European automobile industries were undergoing severe contraction.

SELECTED COUNTRIES - 1982

Country	Passenger Cars	Trucks and Buses	Total
Argentina	106,880	25,236	132,116
Australia	371,442	37,148	408,570
Austria	7,051	8,104	15,155
Belgium	243,289	34,725	278,014
Brazil	474,692	385,901	860,593
Canada	807,645	468,807	1,276,452
Czechoslovakia	173,517	50,932	224,449
France	2,777,125	371,682	3,148,807
Germany, East	183,000	38,800	221,800
Germany, West	3,761,436	301,229	4,062,665
Hungary	---	13,600	13,600
India	42,673	109,576	152,249
Italy	1,297,351	155,692	1,453,043
Japan	6,881,586	3,850,208	10,731,794
Korea	94,460	69,024	163,484
Mexico	300,579	172,058	472,637
Netherlands	86,000	10,050	96,050
Poland	229,111	47,240	276,351
Portugal	---	100	100
Romania	75,000	50,000	125,000
Spain	927,500	142,007	1,069,507
Sweden	294,792	54,274	349,066
Switzerland	---	768	768
United Kingdom	887,679	268,798	1,156,477
United States	5,073,496	1,912,099	6,985,595
U.S.S.R.	1,307,000	865,700	2,172,700
Yugoslavia	211,372	29,944	241,316
TOTAL	26,614,656	9,473,702	36,088,358

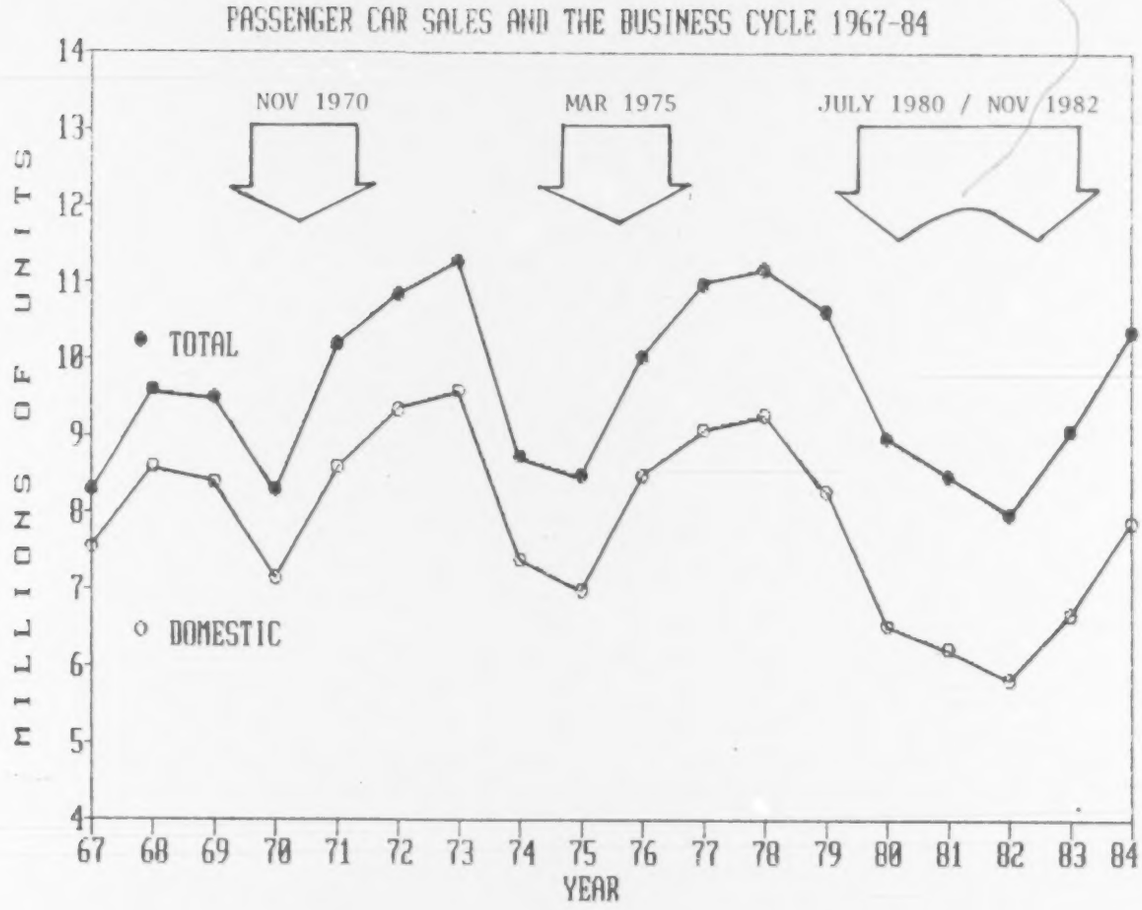
SOURCE: Compiled by the Motor Vehicle Manufacturers Association of the U.S.



PASSENGER CAR SALES

Closer examination of passenger car sales between 1967 and 1984 clearly illustrates the cyclical behavior of the U.S. automobile market. Charted below are domestic and total sales of new cars in the United States set against the three most recent low points of the general business cycle. Each period of recession coincides with decreased automobile sales, and economic recovery is accompanied (and given impetus) by resurgence of the new-car market.

The graph also shows how each slump in domestic auto sales, caused in part by rising fuel prices, has also allowed imports to capture a larger share of the U.S. market. Thus, domestic firms lost sales not only because of the economic recession but also because they were not in a position to compete effectively with foreign automakers (principally the Japanese) in the more fuel-efficient size classes that were in greater demand due to the price of gasoline at that time.



SOURCES: Passenger car sales: M.V.M.A. Motor Vehicle Facts and Figures, various years; General business cycle: U.S. Department of Commerce, Statistical Abstract of the United States.

NEW-CAR MARKET SHARES

Examination of the new-car market indicates how economic conditions affect the buying habits of American consumers. Rising gasoline prices and the general recession in 1980 helped spur sales of imported automobiles in this country. At the same time, the market for large, less fuel-efficient, domestic cars declined. As a result, the Ford Motor Company, which relied on large cars to generate the largest share of its profits, suffered considerable losses.

As the economy improved, there was a resurgence in the sale of automobiles in the intermediate size class and a dramatic increase in the number of luxury cars sold. Until recently, the market for luxury cars rarely exceeded 5.5 percent. The present market share of 8.3 percent reflects a growing consumer interest in more comfortable and luxuriously equipped vehicles. The increase in the number of intermediate-sized cars and luxury models, combined with a decrease in the market share of large vehicles, suggests that recent energy price increases may have had a lasting impact on the domestic auto market. Even though consumers purchased fewer subcompacts and compacts in 1984 than they did three years earlier, the large-car market has not rebounded. Instead, consumers wanting to move up in size class or in the product line have bought either more fuel-efficient midsize cars or one of the smaller luxury models, often with added optional equipment.

NEW CAR MARKET SHARES

PERCENT OF MARKET

By Manufacturer	1979	1980	1981	1982	1983	1984
General Motors	46.1	46.1	45.9	44.5	44.1	44.1
Ford	20.6	16.4	16.2	16.9	17.1	18.8
Chrysler	8.9	7.4	8.6	8.7	9.2	9.5
American Motors	1.5	1.7	1.6	1.4	2.1	1.8
V.W. of America*	1.6	2.0	1.9	1.1	.9	.7
Honda*	—	—	—	—	.6	1.3
Imports	21.9	26.7	27.3	27.9	26.0	23.5

* U.S. built units only
# Checker Auto Company excluded from all calculations.

By Size Class	1979	1980	1981	1982	1983	1984
Domestic						
Subcompact	12.9	15.4	17.1	16.7	12.7	14.0
Compact	20.9	21.0	20.2	17.5	16.4	18.1
Intermediate	23.8	21.4	20.4	19.0	26.5	25.5
Standard (large)	15.1	11.1	10.2	13.4	12.7	10.6
Luxury	5.5	4.5	4.9	5.6	5.7	8.3
Imports**	21.9	26.7	27.3	27.9	26.0	23.5

** Mostly subcompacts, with a few compacts and intermediates.

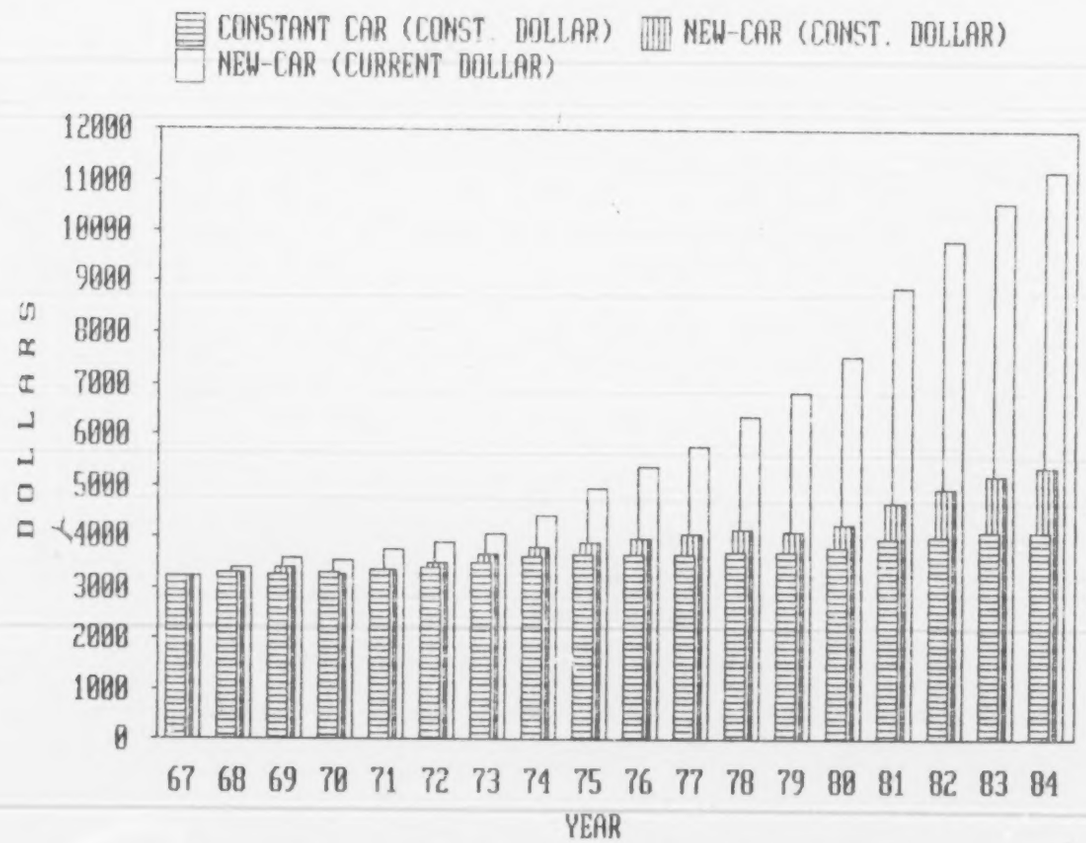
Source: M.V.M.A. "Facts and Figures"
Calendar Years 1979-1984

AVERAGE ANNUAL NEW-CAR EXPENDITURES

The average consumer expenditure for a new car has risen steadily over the past two decades, but appearances are deceptive. While it is true that buyers pay about three and one-half times more for a new car today than they did in 1967, much of this is the effect of inflation. In constant dollars, the average new-car expenditure in 1984 was about 70 percent higher than 18 years ago. A large part of this rise is due to shifts in consumer preferences toward more luxurious models with more optional equipment.* To adjust for the escalation of consumer taste, the U.S. Department of Commerce Bureau of Economic Analysis has devised the concept of the "constant car", i.e., an automobile with value and equipment equivalent to that of the average car bought in 1967. In terms of equivalent value and price, the amount paid for the constant car in constant dollars in 1984 was about $4,100 compared to $3,200 in 1967. But even this may not be an accurate measure of the trend in car prices. The automobiles of today contain a substantial number of mandated safety and emission-control features. If the cost of this equipment is deducted, the average price of a new automobile (in 1967 dollars) has remained virtually constant at $3211 over the past 18 years.

* For many years, the average price paid for imports was substantially below that for domestic models. However, the price differential has diminished steadily, and today it is negligible. The average price paid for imports was 3 percent higher than for domestics in 1983. The year before, domestics were 2 percent higher than imports. In part, this is a reflection of the general upscale trend in consumer preference, but it also stems from Japanese marketing strategy. Faced with voluntary restraint agreements limiting the number of units exported to the United States, Japanese firms raised the price of their cars arbitrarily and shipped a greater proportion of more expensive models at the top of their product lines.

AVERAGE ANNUAL NEW-CAR EXPENDITURES

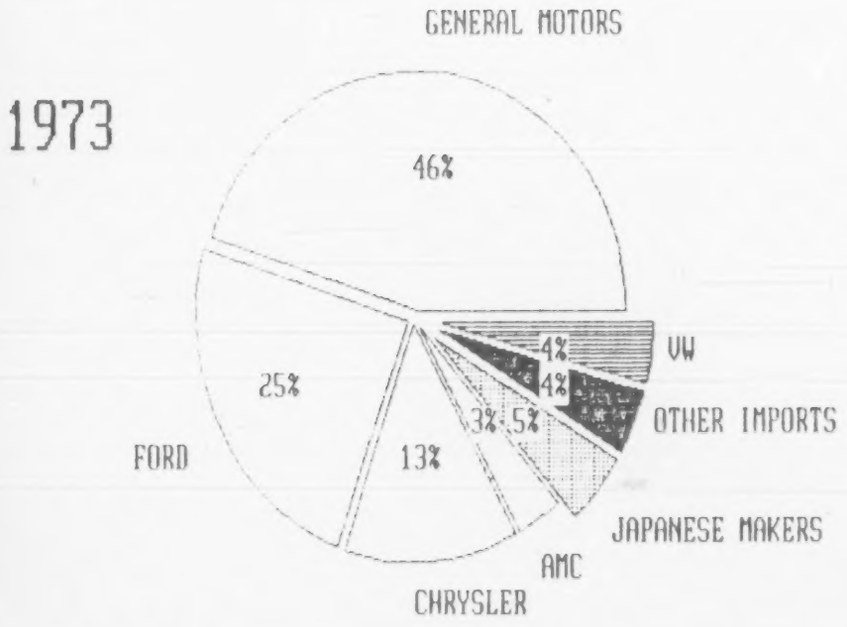


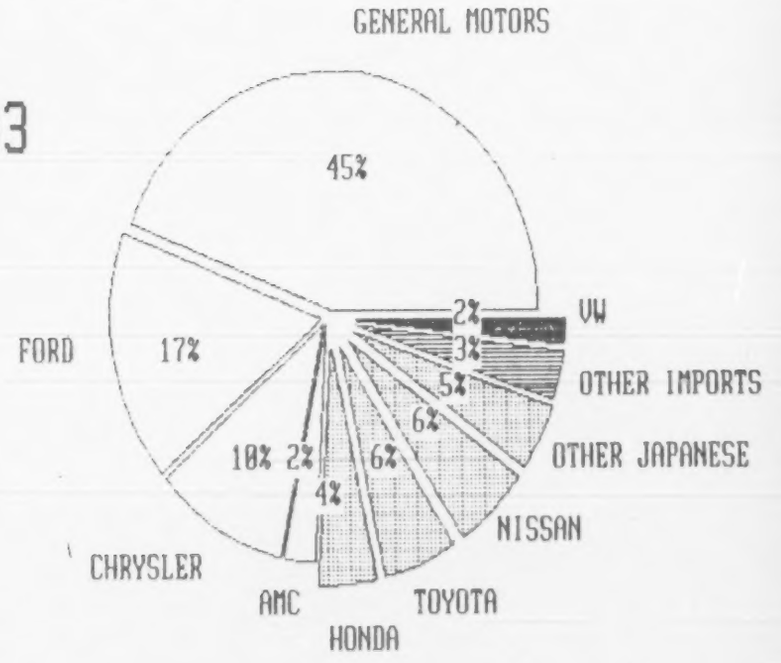
SOURCE: M.V.M.A. Motor Vehicle Facts and Figures, 1984, based on U.S. Department of Labor and U.S. Department of Commerce data.

U.S. CAR SALES BY MAJOR MANUFACTURER

The composition of the U.S. automobile market changed significantly between 1973 and 1983. Within ten years, imports increased their share of total sales from 13 to 26 percent. The Japanese manufacturers were particularly successful, tripling their share of the market at the expense of both European and domestic producers. Three of the largest Japanese automakers captured more than half of the import market in 1983, despite voluntary restraint agreements which limited the number of cars exported to the United States. As the accompanying charts illustrate, Japanese manufacturers have been the driving force behind the growing market share of imports in this country. The popularity of Japanese nameplates such as Honda, Toyota, and Nissan has contributed to a substantial decline in the sales of other major manufacturers. The Ford Motor Company was especially hard hit by foreign competition, losing 8 percentage points of the market in a ten-year period. Volkswagen was hit even harder; they lost 2 percentage points, which was equivalent to half their share of the U.S. market.

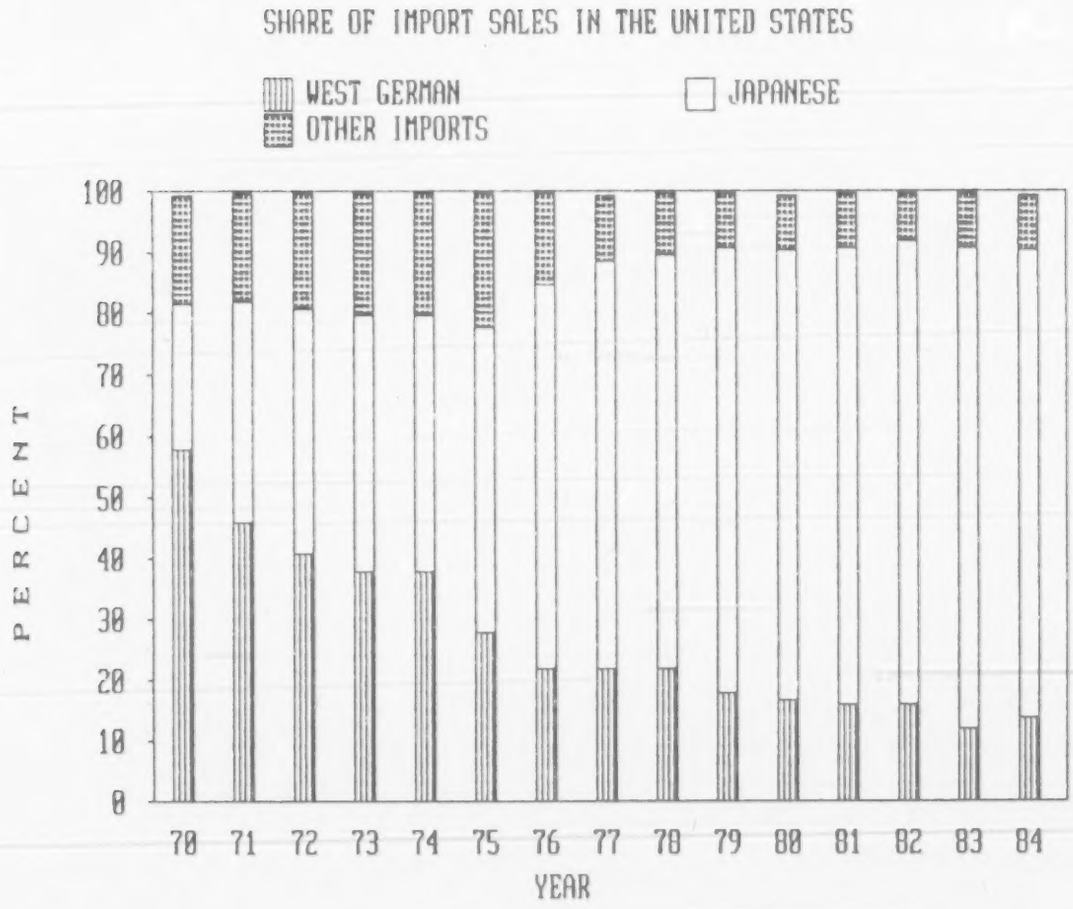
U.S CAR SALES BY MAJOR MANUFACTURER





SHARE OF IMPORT SALES IN THE UNITED STATES

The changing composition of the market is further illustrated by examining the share of automobile sales among the Japanese, West German, and other foreign producers. Over the last fifteen years, the Japanese have gradually emerged as the dominant offshore automaker. Much of the early gains came at the expense of the West Germans whose high performance vehicles were frequently less fuel-efficient than their Japanese counterparts. In subsequent growth, Japan captured a share of the market formerly held by Swedish, British and Italian manufacturers, again for reasons of fuel economy but also because the Japanese offered an attractive line of new products well attuned to the U.S. market. Japanese manufacturers have accomplished this task by producing small cars of high quality and workmanship at far less cost than is presently possible either in the United States or in many Western European countries. Since 1979, Japan, West Germany, and other European producers have retained relatively stable market shares, indicating perhaps that competition among these nations for the U.S. market may have reached a point of equilibrium.

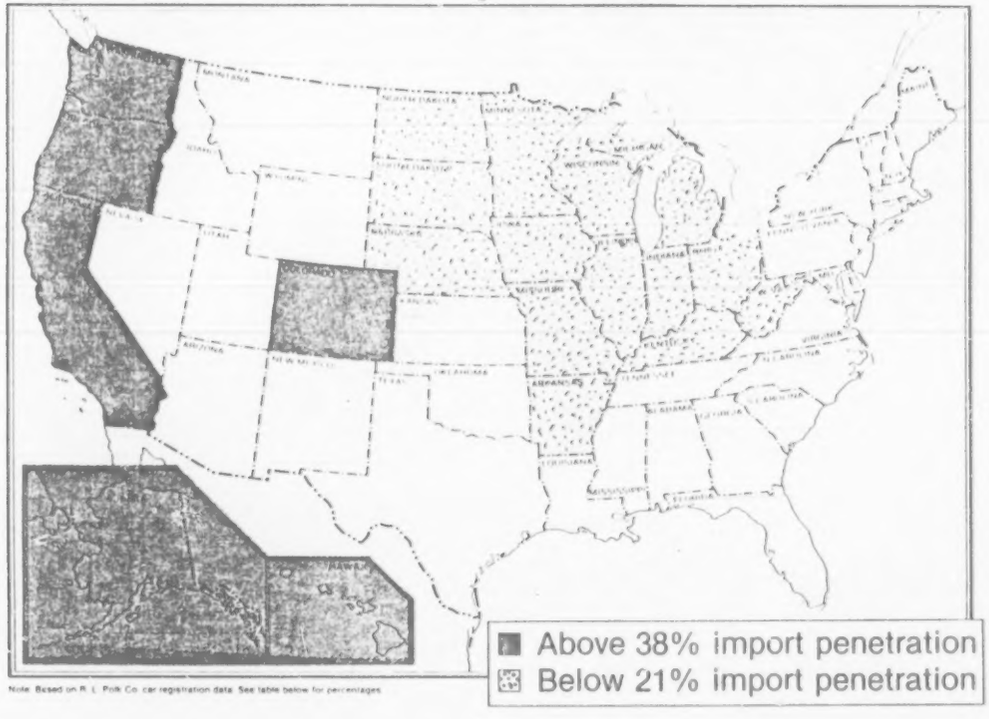


SOURCES: M.V.M.A. Motor Vehicle Facts and Figures
M.V.M.A. World Motor Vehicle Data Book, 1983
The Automotive News

HIGHS AND LOWS OF IMPORT PENETRATION

Market penetration by foreign automakers, dominated by Japanese firms which have captured almost 80 percent of import sales, is not uniform across the United States. The map below reveals an interesting pattern of import sales state by state. Penetration is greatest on the West Coast and in Alaska and Hawaii — areas that lie on the Pacific Basin and are most readily accessible by ship from Japan. Import penetration is least in the heartland of the Midwest, where there is a high concentration of domestic automobile firms and where U.S. automakers enjoy the advantage of short radial lines of transportation from factory to show room. Between these two zones is a U-shaped area of intermediate import penetration that includes all of the Eastern and Southern seaboard and the Western States that lie adjacent to the Pacific Coast. The pattern suggests that Japanese (and European) firms are most successful in areas where their landed cost advantage over U.S. firms gives them greatest leverage — on the seacoast and in the ring of States immediately inland. This advantage diminishes toward the center of the country as rail and truck transport costs from seaports increase.

Highs and Lows of Import Penetration



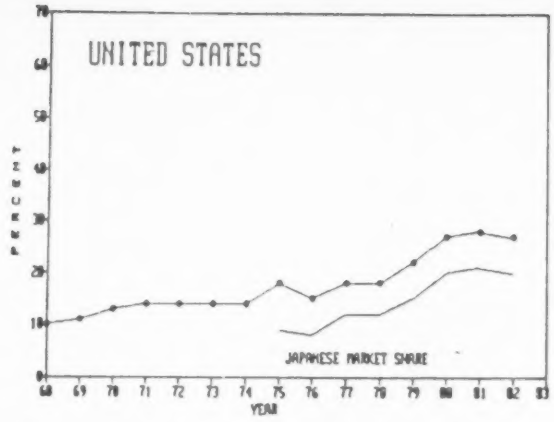
Note: Based on R. L. Polk Co. car registration data. See table below for percentages.

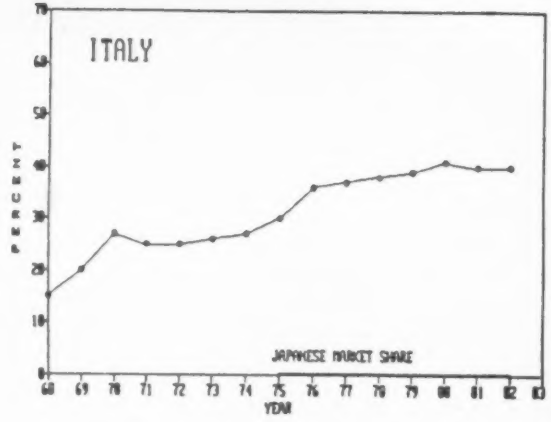
PERCENTAGE OF IMPORTS IN SELECTED AUTOMOBILE-PRODUCING COUNTRIES

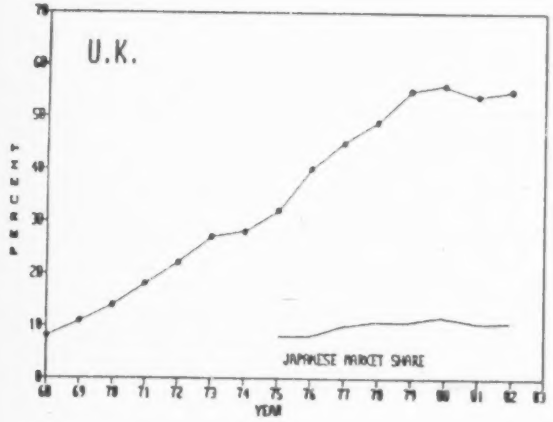
The growing market share of imports has been of concern in the United States for over a decade. Imports now account for over one-quarter of new-car sales, and some observers predict that the share may reach 30 to 35 percent by 1990. The problem of import penetration is not unique to the United States. Most automobile-producing countries find that foreign cars capture a significant part of their home market, often much greater than in the United States.

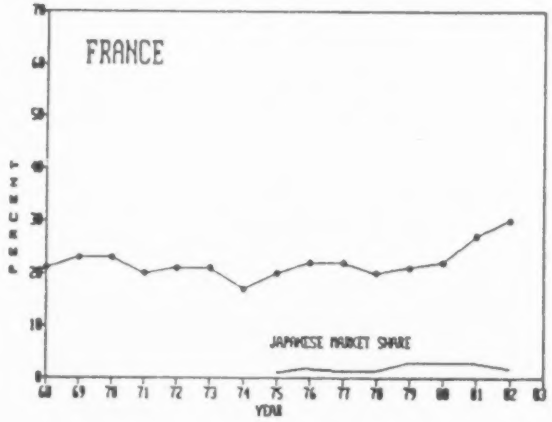
Charted below are the import shares in seven major automobile-producing nations. In France and West Germany, imports take about the same percentage of the market as in the United States. In Italy, imports capture 40 percent of sales. In the UK and Sweden, the import share is 60 percent or more. In most of these countries, the import market share has risen in the past 10 years — in some cases (notably the UK) more steeply than in the United States. Only in Japan do imports account for an insignificant part of the market — less than 2 percent.

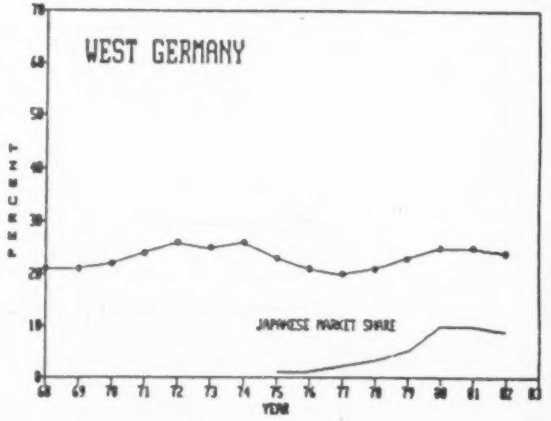
IMPORTS AS A PERCENTAGE OF TOTAL SALES IN SELECTED AUTOMOBILE-PRODUCING NATIONS

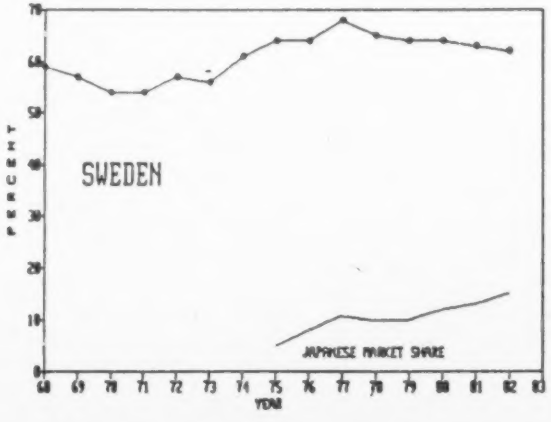


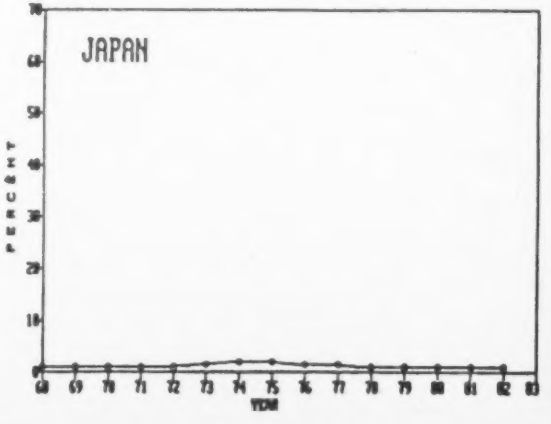












SOURCE: M.V.M.A. World Motor Vehicle Data Book, 1983. (The information that is provided on the following page is also based on this source.)

AUTOMOBILE EXPORTS AS A PERCENT OF PRODUCTION

Imports, in and of themselves, are not a complete picture of national automobile markets or the strength of the domestic industry in a given country. Most industrial nations that manufacture automobiles export a substantial share of their production. Sweden, for example, exports about 20 percent more cars than it imports. The trade balance is similar in West Germany, France, and Italy. Great Britain has had a negative balance of trade in automobiles in recent years, but the disparity is not large — roughly four exported for every five imported. Spain's remarkable rise as an automobile producer is an example of a relatively poor nation using the automobile industry as a mechanism for economic development. Spain currently exports well over half the cars it produces and imports virtually none.

The United States and Japan have diametrically opposite import-export patterns. Japan buys very few foreign automobiles and sends more than half of its production overseas, of which about two-thirds go to North America and one-third to Western Europe. The United States imports over one-quarter of the new cars sold each year but exports only about 7 percent of its production. This 4:1 import-export ratio is the most extreme of any automobile producing nation.

One reason for the low volume of U.S. exports is that cars made for the domestic market, because of their size and price, are not well suited to markets in Europe, South America, and Asia. Another is that U.S. firms have long favored the approach of establishing overseas subsidiaries in target markets, where they produce cars that are tailored to local demands for size, fuel economy, and price. Labor costs abroad are typically lower than in this country, allowing U.S. firms to compete successfully in price with foreign firms. Ford, for example, is the fourth largest auto manufacturer in West Germany and Spain, the third largest in Brazil, the second largest in Great Britain, and the largest in Australia. GM ranks third in Spain and second in Brazil. Overall, Ford manufactures 45 percent of its cars and trucks overseas, and GM 25 percent.

AUTOMOBILE EXPORTS AS

A PERCENTAGE OF PRODUCTION